

WHAT IS CLAIMED IS:

1 1. A method for indirectly estimating ambient air temperature,
2 the method being for use with a vehicle having an engine and a turbocharger, the
3 method comprising:
4 sensing a first turbocharger air inlet temperature;
5 indirectly estimating a first ambient air temperature by filtering the
6 first turbocharger air intake temperature to compensate for engine compartment
7 temperature variations relative to actual ambient air temperature; and
8 controlling the vehicle based on the estimated first ambient air
9 temperature.

1 2. The method of claim 1 wherein the filtering comprises
2 compensating for a vehicle operation which causes the engine compartment
3 temperature variations relative to actual ambient air temperature.

1 3. The method of claim 2 wherein the filtering comprises adding
2 a temperature filtering value to the first turbocharger air inlet temperature.

1 4. The method of claim 3 wherein the temperature filtering value
2 is based on engine speed to compensate for engine compartment temperature
3 variations due to driving the vehicle.

1 5. The method of claim 4 wherein the temperature filtering value
2 is further based a fan usage time to compensate for engine compartment temperature
3 variations due to fan operation.

1 6. The method of claim 1 further comprising updating the first
2 filtered ambient air temperature estimate based on a temperature difference between
3 the first filtered ambient air temperature estimate and a second filtered ambient air
4 temperature estimate.

1 7. The method of claim 6 wherein the updating comprises adding
2 a temperature update value to the first filtered ambient air temperature estimate.

1 8. The method of claim 7 the temperature update value limits
2 increases to the first filtered ambient air temperature estimate if the second filtered
3 ambient air temperature estimate is greater than the first filtered ambient air
4 temperature estimate to limit unnatural increases in estimating ambient air
5 temperature.

1 9. The method of claim 8 wherein the temperature increase is
2 limited to a maximum percentage increase per wait time, the wait time
3 corresponding to a period of time between sensing the first and the second
4 turbocharger air inlet temperature.

1 10. The method of claim 6 further comprising storing the updated
2 ambient air temperature estimate as a frozen ambient air temperature estimate if an
3 engine load is greater than an engine load limit to compensate for engine
4 compartment temperature variations due to the engine operating above the engine
5 load limit.

1 11. The method of claim 10 further comprising storing the frozen
2 ambient air temperature estimate only if the engine load is greater than the engine
3 load limit for a period of time longer than a load limit interval.

1 12. The method of claim 11 further comprising storing a sensed
2 barometric pressure occurring proximate in time to storing the frozen ambient air
3 temperature estimate for use in adjusting the frozen ambient air temperature estimate
4 according to changes in barometric pressure.

1 13. The method of claim 12 further comprising calculating a
2 change in sensed barometric pressure, updating the frozen ambient air temperature
3 estimate as a function of the change in sensed barometric pressure.

1 14. The method of claim 13 wherein updating the frozen ambient
2 air temperature comprises increasing the frozen ambient air temperature estimate if
3 the barometric pressure increases and decreasing the frozen ambient air temperature
4 estimate if the barometric pressure decreases.

1 15. A system for controlling an engine by indirectly estimating
2 ambient air temperature, the system comprising:
3 means for determining a turbocharger air inlet temperature; and
4 means for estimating ambient air temperature based on data received from the
5 turbocharger air inlet temperature;
6 means for filtering the estimate ambient air temperature to
7 compensate for engine compartment temperature variations causing the turbocharger
8 air inlet temperature to inaccurately represent actual ambient air temperature; and
9 means for controlling engine operation based on the filtered ambient
10 air temperature estimate.

1 16. A system for controlling an engine by indirectly estimating
2 ambient air temperature, the system comprising:
3 a sensor for sensing a turbocharger air inlet temperature; and
4 an engine control module configured for:
5 estimating ambient air temperature based on the turbocharger
6 air inlet temperature,
7 filtering the estimate ambient air temperature to compensate
8 for engine compartment temperature variations causing the turbocharger air inlet
9 temperature to inaccurately represent actual ambient air temperature; and
10 controlling engine operation base on the filtered ambient air
11 temperature estimate.

1 17. The system of claim 16 wherein filtering comprises adding a
2 temperature filtering value to the first turbocharger air inlet temperature, the
3 filtering value based on both an engine speed to compensate for engine compartment
4 temperature variations due to driving the vehicle and a fan run time to compensate
5 for engine compartment temperature variations due to fan operation.

1 18. The system of claim 16 further comprising storing the filtered
2 ambient air temperature estimate as a frozen ambient air temperature estimate if an
3 engine load is greater than an engine load limit to compensate for engine
4 compartment temperature variations due to the engine operating above the engine
5 load limit.

1 19. The system of claim 18 wherein the frozen ambient air
2 temperature estimate is updated based on a change sensed barometric pressure.

1 20. The method of claim 19 wherein the frozen ambient air
2 temperature is increased if the barometric pressure increases and decreased if the
3 barometric pressure decreases.